USER'S MANUAL

Sweep Function Generator

SWF-8020

CIRCUIT-TEST ELECTRONICS

www.circuittest.com

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SAFETY INFORMATION

Caution and proper guidelines must be followed for personal and product safety. Read this instruction manual carefully before using the instrument.

⚠ *CAUTION:*

This instrument can operate on 115VAC or 230VAC. Before connecting the AC power plug to an AC line outlet, be sure to check that the voltage selector plug is set in the correct position corresponding to the line voltage. The instrument may not operate properly or may get damaged if it is connected to incorrect AC line voltage. Whenever line voltage is changed, fuse must be replaced with appropriate correct value.

SELECTOR	LINE VOLTAGE	FUSE
115V	100~125V 50/60Hz	600mA
230V	220~240V 50/60Hz	300mA

This instrument has been designed for indoor use only. Operating temperature of this instrument is 10°C to 40°C (50°F to 104°F). Operation outside of this temperature range may cause damage to the circuits.

Do not use this instrument in a place where strong magnetic or electric fields exist. Such fields may adversely affect the measurements.

If the instrument is used in a manner not specified by the manufacturer then protection mechanisms built into the instrument may not function properly.

⚠ *WARNING:*

The following precautions must be observed to help prevent electric shock:

1. When the instrument is used to make measurements where high voltages are present, there is always a certain amount of danger from electrical shock. The person using the instrument in such condition should be a qualified electronics technician or otherwise trained and qualified to work in such circumstances.
2. The ground wire of the 3-wire AC power plug places the chassis and housing of the instrument at earth ground. Use only a 3-wire outlet, and do not attempt to defeat the ground wire connection or float the instrument, since doing so may pose a great safety hazard.
3. Never apply external voltage to the output BNC of the instrument.
4. Excessive voltage applied to the input BNC may damage the instrument.
5. Do not operate the instrument with the cover removed unless by a qualified service technician.

INTRODUCTION

DESCRIPTION

The SWF-8020 is a multi-purpose, highly reliable 3 MHz sweep function generator. Rugged and easy to use with many convenient features ideal for the hobbyist, educational, manufacturing or R&D laboratories.

FEATURES:

Function Generator:

Unlike conventional function generators, the SWF-8020 provides 6 waveforms.

Pulse Generator:

Adjustable pulse width from 100ns to 0.4s make the SWF-8020 an ideal instrument for Audio, Video and other basic electronic circuit applications.

Sweep Generator:

SWF-8020 provides linear sweep or log sweep selection switch to select the sweep mode. Maximum sweep width is 1:100 and sweep speed is from 5sec to 10ms. It also provides single sweep or synchro-sweep output function.

Excellent Heat Dissipation:

This function generator is based on the continuous charge/discharge of a capacitor to produce the output waveform. Any change on the capacitor value will cause a different frequency to be generated. Temperature rises within the instrument will also change the capacitance. Thus keeping the inner temperature constant becomes a very important factor on the stability of the frequency generated.

SPECIFICATIONS

1. GENERAL SPECIFICATIONS

Frequency:	0.5Hz ~ 3MHz in 6 steps
Output Waveform:	Sine, Square, Triangle, Ramp, Positive Pulse and Negative Pulse
Stability:	0.1% - 15minutes after power on
	0.2% - 24hrs after power on
DC Offset:	Continuous Adjustment, ±10V at no load or ±5V at 50Ω load
Power source:	AC 115V (±10%) 50/60HZ, FUSE: 600mA
	AC 230V (±10%) 50/60HZ, FUSE: 300mA
Power Consumption:	25W
Operating Temperature:	0°C ~40°C, 10~80% R.H.
Storage Temperature:	-20°C ~70°C, 0~90% R.H.
Dimensions:	275 x 90 x 300 mm
Weight:	2.5Kg Net
Accessories:	Power cord, Instruction Manual

2. RAMP WAVE

Frequency:	0.5Hz - 2.5MHz
Symmetry:	80% (rise wave) to 20% (fall wave), < 5%, 1Hz ~ 100 KHz
Rise Wave Linearity:	< 2%, 1Hz - 100 KHz

3. TRIANGLE WAVE

Frequency:	0.5Hz - 3MHz
Symmetry:	50% (rise wave) to 50% (fall wave), < 2%, 1Hz ~ 100 KHz
Linearity:	< 1%, 1Hz - 100 KHz

4. SINE WAVE

Frequency:	0.5Hz ~ 3MHz
Distortion:	< 2%, 1Hz ~ 100 KHz
Harmonic Ratio:	< 30dB, 100 KHz ~ 3MHz
Frequency Response:	< 0.1dB up to 100 KHz
	< 1dB 100KHz to 3MHz

5. SQUARE WAVE

Frequency:	0.5Hz - 3MHz
Symmetry:	50% (positive half) to 50% (negative half), < 2%, 1Hz ~ 100 KHz
Rise Time:	< 60ns

6. POSITIVE PULSE

Frequency:	0.5Hz ~ 2.5MHz
Width:	0.4sec ~ 100ns continuous adjustment
Symmetry:	20% to 80%, < 5%, 1Hz ~ 100 KHz
Rise Time:	< 60ns

7. NEGATIVE PULSE

Frequency:	0.5Hz ~ 2.5MHz
Width:	0.4sec ~ 100ns
Symmetry:	80% to 20%, < 5%, 1Hz ~ 100 KHz
Fall Time:	< 60ns

8. MAIN OUTPUT

Output Impedance:	50Ω, < 2% Accuracy
Max. Output:	20Vp-p (No load), ±1Vp-p
	10Vp-p (50Ω load), ±0.5Vp-p
Min. output:	0.1Vp-p (No load) and 0.05V (50Ω load)
Attenuator:	One -20dB, < 2% Accuracy

9. SYNCHRONOUS OUTPUT

Output Impedance:	50Ω, < 2% Accuracy
Output Level:	TTL level, > 3Vp-p fixed amplitude
Fan out:	> 20
Rise Time:	< 30ns

10. VCF INPUT

Input Impedance:	0 ~ 10V
Input Frequency:	DC ~ 1 KHz
Input Frequency Variance:	1:1 to 1:1000

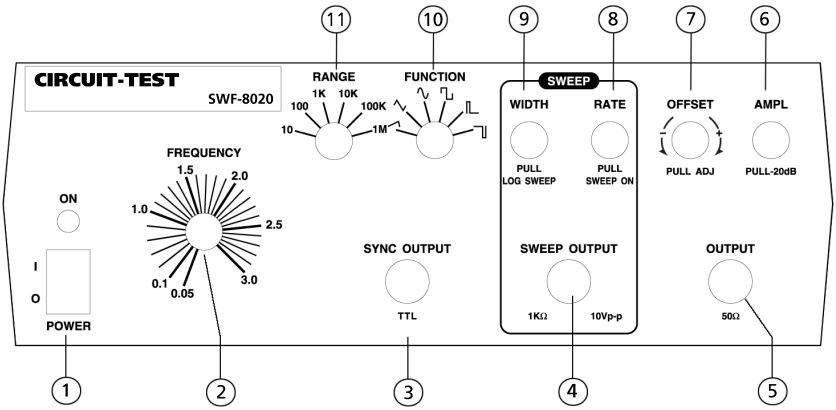
11. SWEEP SYNCHRONOUS OUTPUT

Output Impedance:	1 KHz, < 2%
Output Waveform:	Linear or Log Sweep Ramp Wave
Output Amplitude:	10Vp-p (No load) or 5Vp-p (1KΩ load)
Output Frequency:	0.2Hz ~ 100Hz, continuous adjustment

12. SWEEP GENERATOR

Sweep Form:	Linear or Log switchable
Sweep Speed:	5sec ~ 10ms, continuous adjustment
Sweep Width:	1:1 ~ 1:100

FRONT PANEL DESCRIPTION



1. POWER SWITCH - When pushed "ON" the switch will light the power pilot "LED" above the switch.
2. FREQUENCY - Fine adjustment for the frequency. The frequency will be the product of the scale indicated by (2) and (11)
3. SYNC OUTPUT - Synchronous Output. A TTL level Square wave output with same frequency as the Main output BNC.
4. SWEEP OUTPUT - Sweep signal output BNC. It will operate independently whether the SWEEP is ON or OFF; the BNC will output the sweep ramp wave. The frequency is controlled by sweep rate (8)
5. MAIN OUTPUT - Function wave output BNC. Output impedance is 50Ω, maximum amplitude is 20Vp-p for no-load and 10Vp-p for 50Ω load.
6. AMPLITUDE - Turn the knob to adjust the output signal amplitude. Pull out the knob to attenuate the output 10 times. This affects the Main output (5) signal only.
7. DC OFFSET - The knob controls the bias circuit, it is set at OFF position in normal use. Pull "ON" and turn to adjust the DC offset voltage.
8. SWEEP RATE - Turn this knob to adjust the sweep rate from 5sec to 10ms, the sweep output is BNC (4). If this knob is pulled out then the main output (5) and sweep output (4) are synchronous.
9. SWEEP WIDTH - Turn this knob to adjust the sweep width. Push in for a linear sweep, pull out for a log sweep. Knob (8) must be pulled out or this control is disabled.
10. FUNCTION WAVE SELECTOR - Turn this to select the output waveform.
11. FREQUENCY RANGE - Main adjustment of the frequency. The output frequency will be 10 times on each step changed. The frequency of the output signal is the product of the scale indicated by (2) and (11).

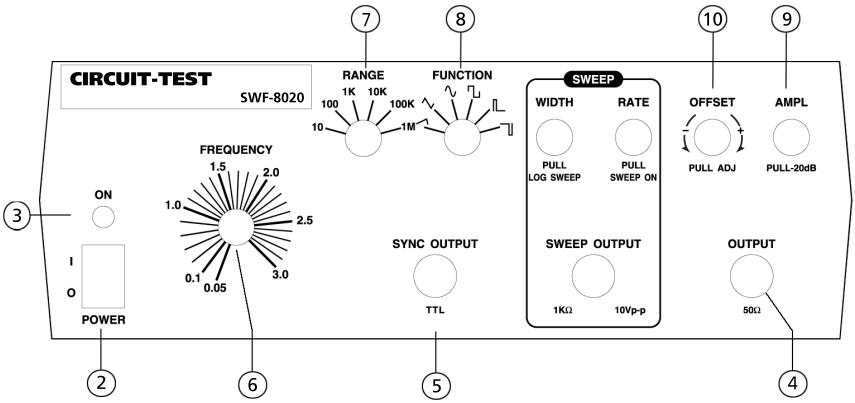
WARNING:

Before applying power to SWF-8020, make sure correct input voltage has been selected.

CAUTION:

All the knobs on the SWF-8020 are set at "push" position unless specially marked "pull."

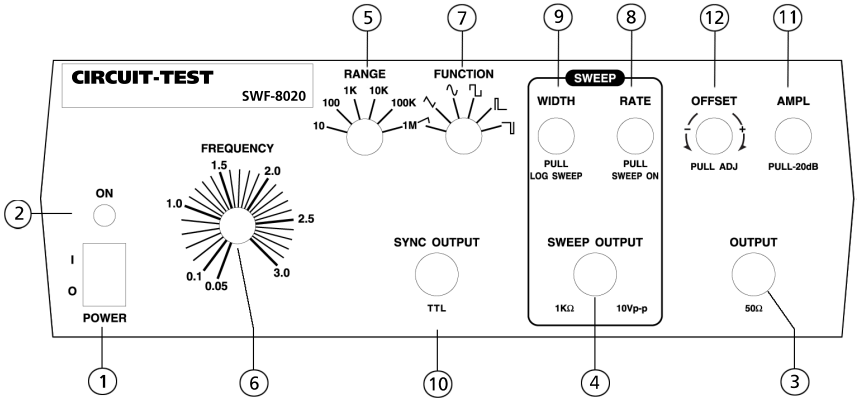
A. FUNCTION GENERATOR



1. Check that the AC line voltage selector plug on the rear panel of SWF-8020 is in the correct position for the AC line voltage.
2. Switch on the power switch and make sure that the power pilot LED is lit.
3. Connect the OUTPUT BNC (4) of the SWF-8020 to the CH1 INPUT BNC of the oscilloscope. Adjust the oscilloscope for best view of the waveform.
4. Connect the SYNC OUTPUT BNC (5) to the CH2 INPUT BNC of the oscilloscope and set the TRIG source of the oscilloscope at CH2 position.
5. Turn the FREQUENCY knob (6) of SWF-8020 from 0.05 to 3.0 positions and check the waveform displayed on the oscilloscope. The frequency will vary slowly on each step.

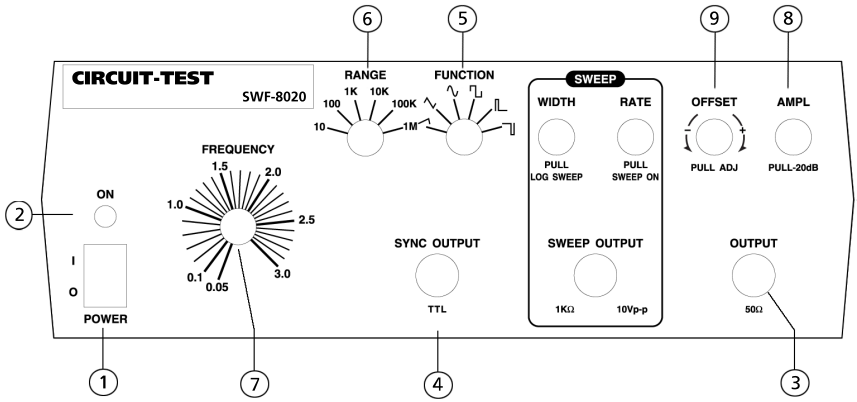
6. Turn the RANGE knob (7) clock-wise from 10 to 1M. The frequency will increase 10 times on each step. If turning the knob counter-clock-wise from 1M to 10, the frequency will reduce 10 times on each step.
7. Turn the FUNCTION knob (8) to change the waveform generated by SWF-8020 and displayed on oscilloscope. CH1 will display the waveform as indicated by the FUNCTION knob (8) of SWF-8020, However, CH2 will always display a TTL square wave only, but the frequency of CH2 will synchronously change as CH1 changes.
8. Turn the AMPL knob (9). The amplitude of CH1 on the oscilloscope will change but CH2 will not. Pull out the knob, the amplitude of CH1 will be reduced 10 times but CH2 will remain unchanged.
9. Turn the OFFSET knob (10), the display on the oscilloscope will be unchanged. Pull out the knob. The display of CH1 on the oscilloscope will now be affected by the DC offset voltage as controlled from +10V to -10V by turning the knob. The CH2 display will be unaffected. Note that the CH1 display may be cut off if the DC offset voltage is too high.

B. SWEEP GENERATOR



1. Switch on the SWF-8020 and connect it to the oscilloscope, Main output (3) to CH1.
2. Connect the SWEEP output (4) BNC to CH2.
3. Set the RANGE (5) of SWF-8020 at 100K position.
4. Set the FREQUENCY (6) of SWF-8020 at 1.0 position.
5. Set the FUNCTION (7) of SWF-8020 at sine wave.
6. Turn the SWEEP RATE (8) knob, the display of CH1 will remain unchanged. Only the display of CH2 will be affected. Since knob (8) is pushed in the sweep output will operate independently. Pull out knob (8) to set SWF-8020 SWEEP ON and turn the knob to set the sweep rate from 5sec. to 10ms. Both CH1 and CH2 displays will be affected.
7. NOTE: After "PULL SWEEP ON", the trigger source of the oscilloscope must be changed to CH1.
8. Turn the SWEEP WIDTH (9) to adjust the sweep width according to the display of CH1 on the oscilloscope to set the sweep width and sweep rate. Set the FREQUENCY knob (6) at 0.05 to have the maximum sweep width (>100 times). It is most commonly used when doing audio or circuit bandwidth testing. Pull out knob (9), the sweep mode will be changed from linear sweep to Log sweep. The waveform displayed on CH1 will be log form.
9. SYNC OUTPUT (10) - The BNC will synchronously output a TTL signal to use as a signal source for an oscilloscope or counter, etc.
10. AMPL (11) - Turn this knob to adjust the amplitude of the signal from the Main output.
11. OFFSET KNOB (12) - This sets the DC offset voltage of the signal from the Main output. This knob will operate only at the "PULL" position.

C. PULSE GENERATOR



1. Switch "ON" the power switch (1) and make sure the pilot "LED" has been lit.
2. Connect the output BNC (3) to CH1 input of the oscilloscope.
3. Connect the "SYNC OUT" (4) BNC to CH2 input of the oscilloscope.
4. Set the "FUNCTION" (5) selector at positive pulse position.
5. Set the "RANGE" (6) at the desired frequency. In this example, set at 100K position.
6. Set the "FREQUENCY" (7) at the desired frequency. The frequency will be the product of the settings indicated by (6) and (7). In this example set (7) at 1.0 position.

Example: The frequency: 100K x 1.0 = 100 KHz
The pulse width: (1/frequency) x 15%
= (1/100 KHz) x 15% = 1.5uS

The pulse output from "SYNC OUTPUT" TO CH2 will be the same 1.5uS width TTL pulse.

7. Adjust the "AMPL" (8) knob to adjust the amplitude of the output pulse. Or "PULL" out this knob to attenuate the output signal to 1/10, but the CH2 "SYNC OUTPUT" will not be affected.
8. PULL OUT the "OFFSET" (9) knob and turn to adjust the DC offset voltage if necessary. CH2 will not be affected by this.
9. Set the "FUNCTION" (5) selector to negative pulse and operate as steps 5, 6, 7, and 8 as above.

MAINTENANCE

GENERAL MAINTENANCE

Clean and recalibrate the instrument on a regular basis to keep the instrument working well.

Never place heavy objects on the instrument.

Never place a hot soldering iron on or near the instrument.

Never insert wires, pins, or other metal objects into the ventilation fan.

Do not obstruct the ventilation holes in the rear panel, as this will increase the internal temperature.

Never move or pull the instrument with the power cord or a probe cord. Never move instrument when the power cord or a signal probe is connected to a circuit.

Remove any dirt, dust and grime whenever they become noticeable. Dirt on the outside covers can be removed with a soft cloth moistened with a mild cleaning solution.

FUSE REPLACEMENT

If the fuse blows, the "ON" indicator will not light and the instrument will not operate. Replace only with the correct value fuse. The fuse is located on the rear panel adjacent to the power cord receptacle.

Remove the fuse holder assembly as follows:

1. Unplug the AC power cord from rear of instrument.

2. Insert a small screwdriver in fuse holder slot (located between fuse holder and receptacle) and pry the fuse holder away from receptacle.

3. When re-installing the fuse holder, make sure the fuse is installed so that the correct line voltage is selected.

LIMITED WARRANTY

Circuit-Test Electronics warrants to the original purchaser that this product be free of defect in material or workmanship for a period of 2 years from the date of purchase.

Any product which has been subjected to misuse or accidental damage is excluded from the warranty. Except as stated above, Circuit-Test Electronics makes no promises or warranties either expressed or implied including warranties of merchantability or the fitness for any particular purpose.